

# AT ENTERPRISES

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## WE DO NOT REST ON OUR ACHIEVEMENTS

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The work done at an enterprise to expand the product line and improve product quality is shown. When the container glass line was reconstructed, the furnace operation was improved, the mix dispensing system was upgraded, the chemical composition of the glass was changed, and article monitoring at the exit was tightened. These and other actions improved product quality improved and expanded the product line.

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In the mid-1990s the management of the Salavatsteklo made a decision, during a difficult period for all industry in Russia, to expand its product line and began organizing container glass production, which was new for the plant. The first container-glass line from the SKLOSTROJ Company (Czechoslovakia) was put into operation in 1998; a second line from the HEYE International GmbH Company (Germany) with total capacity  $100 \times 10^6$  bottles/yr (0.5 liter bottles) was put into operation in 2000.

A management and quality system, meeting the requirements of MS ISO 9001 and encompassing the development, production, and delivery of glass containers, was adopted at Salavatsteklo in 2005.

Currently, a system for ecological management ISO 14001 and a management system for protecting the health and safety of the workers OHSAS 18001 are being developed.

As a result of reconstruction, in 2007 glass container production reached the European technical level.

In preparing for and performing the reconstruction of the glass container production line, priority was given to product quality, work stability, and cost-effectiveness. From the moment molten glass was poured off, the glassmaking furnace has now been operating for 9 years and 3 months.

On the basis of operating experience specialists at the Salavatsteklo JSC actually designed a new furnace in consultation with HORN Industries AG. The automated thermal-process control system of the furnace was replaced through the efforts of the Engineering Office SsevZapMontazh-

Avtomatika (St. Petersburg). The mix/cullet dispensing system was upgraded with the participation of Stromizmeritel' JSC (Nizhny Novgorod); this made it possible to maintain the mix/cullet ratio strictly.

Only high quality refractory was used to build the furnace. The system for transferring gas and air and the gas burner units were replaced; the fuel feed angle into the glassmaking part was changed and the burner inlets were changed; bubbling of the molten glass was established; the loading hopper was structurally altered into two DO HOUSE type hoppers with two high-capacity mix loaders. HORN supplied all equipment installed. The construction of the loading hopper (distance to the inlet of the first pair of burners), the optimized height of the coolers in front of the hopper arch, the work of the blades and the vibrating tray of the loader (thin and uniform layer of mix) made it possible to preserve the required hydraulics of the glassmaking furnace and increase the time between the cleanings of the elements of the checkerworks and the sub-checkerworks chambers to 1.5–2 yr. The basic depth was increased and the height and location of the threshold were changed as were the channel and the construction of the bottom of the glassmaking and extraction part.

In the course of the startup and adjustment work, when the glassmaking temperature regimes were chosen, the chemical composition of the glass was changed in the direction of lower content of saltpeter and sodium nitrate in the mix and added carbon. This improved the quality of the finished product with respect to exterior blemishes (the number of bubbles and seeds was decreased). This made it possible to decrease the consumption of heat from 1900–2000 to

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1350 – 1400 kcal per 1 kg of molten glass and the maximum temperature in the founding part from 1570 to 1520°C. To improve the color of the glass, a magnetic separator was installed on the conveyor feeding mix and cullet, and the oxygen content in the outgoing gases was changed in the second pair of burners from 2 to 4%, which made it possible to decrease the content of iron oxides, thereby imparting a greenish color.

Stagnant zones were eliminated as much as possible. However, this subsequently gave not only a positive effect (glass which is more uniform and better prepared for extraction) but also a negative effect, specifically, the well-known “cat’s claw” defect on the surface of the glass, which is due to the corrosion of the zircon-containing refractories. Before reconstruction this defect did not occur in the products produced by the plant.

Using its rich experience and equipment, the HORN Company (VARI DRAIN system — pouring off the zircon-containing glass and the equipment for mixing facilities) together with specialists at Salavatsteklo JSC did the work required to eliminate this defect in two steps. The first step (without stopping production) was to mount a drain apparatus in the bottom part of the feed channel (cooling zone) while optimizing the amount of glass drained and the temperature regime of the molten glass; this made it possible to lower the contrast of this blemish. At the second step the mixing equipment was mounted in the conditioning zone, the depth of the mixers in the glass was optimized, and the rotational speed and glass level in the channel were determined, which made it possible to eliminate this defect.

From the time the line was put into operation in 2007 to this day the technical service of Salavatsteklo JSC has studied the effect of the moisture content of the mix on the process of loading and making the molten glass. The main problem of this work was finding the optimal moisture content to prevent contamination of the elements of the checker work and facilitate the movement of the layer of a mixture of mix and cullet along the vibrating tray of the mix loader. The logistics of the delivery and storage of the mix from DMD (dispensing-mixing division) was determined so as to decrease caking of the mix in the containers, thereby assuring the required moisture content.

Since before the reconstruction one glass forming machine (SKLOSTROJ Company, Czechoslovakia) with a me-

chanical drive (by this time it was operated for 9 years without average and major repairs) was used, a decision was made to replace it. As a result, all formation and transport equipment of the line at the hot end were replaced.

The new machine manufactured by HEYE International GmbH is equipped with axial cooling molds, a modern molten-glass feeder with a servo drive of the scissor mechanism permits fine adjustment of the drop; a universal glass container mover is convenient when changing the product line. Together with specialists from HEYE major repairs were performed in the second machine, which had operated for more than seven years; where axial cooling of the molds was also installed here. This upgrade made it possible to lighten a bottle by 10 – 15% by cooling the molds and distributing the glass more uniformly.

Today the demand for the standard containers is gradually decreasing, the market is continually changing, and the demand for exclusive and souvenir glass containers, especially noncircular containers, is increasing. Twenty four containers with different volume, including six containers with noncircular shape, have already been perfected, and five other types are in the development stage.

Salavatsteklo JSC intends to grow rapidly in all segments of the market. In connection with the expansion of the line of glass containers with irregular shape and mostly rectangular and flat for packaging, a need arose for equipment that would make it possible to reduce manual labor to a minimum. In December 2008 the company Steklopak JSC (Orel) built, delivered and put into operation a two-row loader of articles with irregular shape.

Today, to operate successfully, Salavatsteklo JSC must grow taking into account the demands of the market, expanding the list of products offered and tightening quality control. To solve the last problem a decision was made to acquire inspection monitoring equipment from the French company SGCC&MSC, making it possible to check an article for defects that affect user safety as well as to find inconsistencies in the geometry, eliminating the effect of the human factor.

The policy of this enterprise, aimed at continually increasing product quality, together with a knowledgeable pricing policy will make it possible in the future to always remain in demand in the market for glass containers.